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Technology and Modern Agriculture

Abid Fareed[1] and Abita Devi[2]
M.Tech Scholar[1], Department of Electronics & Communication Engineering
Panchkula Engineering College, Panchkula, Haryana, India
Assistant Professor[2], Panchkula Engineering College, Panchkula, Haryana, India

Abstract - The Information Technology has the capability to transform the world we live in; more-efficient industries, connected cars, and smarter cities are all components of the Information Communication Technology. However, the application of technology in agriculture could have the greatest impact.Against the challenges such as extreme weather conditions and rising climate change, and environmental impact resulting from intensive farming practices, the demand for more food has to be met. Smart farming based on modern technologies will enable growers and farmers to reduce waste and enhance productivity.

Keywords- IOT, Sensors, Wi-FI.

I. Introduction

Information Technology is present everywhere and plays a very dynamic role in the progress and economic development of country. Agriculture sector is regarded as the more crucial sector globally for ensuring food security. Talking to India farmers, which are right now in huge trouble and are at disadvantageous position in terms of farm size, technology, trade, government policies, climate conditions etc. No doubt, ICT based techniques have solved some problems but are not well enough for efficient and assured production.The internet of Things (IOT) is playing vital role in present world specially, the Internet of Things (IOT) is transforming the agriculture industry and enabling farmers to contend with the enormous challenges they face. The industry must overcome increasing water shortages, limited availability of lands, difficult to manage costs, while meeting the increasing consumption needs of a global population that is expected to grow by 70% by 2050. New innovative IOT applications are addressing these issues and increasing the quality, quantity, sustainability and cost effectiveness of agricultural production. Today's large and local farms can, for example, leverage IOT to remotely monitor sensors that can detect soil moisture, crop growth and livestock feed levels, remotely manage and control their smart connected harvesters and irrigation equipment, and utilize artificial intelligence based analytics to quickly analyze operational data combined with 3rd party information, such as weather services, to provide new insights and improve decision making.

II. Enabling Technologies for Smart Farming

Internet of Things has a strong backbone of various enabling technologies- Wireless Sensor Networks, Cloud Computing, Big Data, Embedded Systems, Security Protocols and Architectures, Protocols enabling communication, web services, Internet and Search Engines.

Wireless Sensor Network (WSN): It consists of various sensors/nodes which are integrated together to monitor various sorts of data.

Cloud Computing: Cloud Computing also known as on-demand computing is a type of Internet based computing which provides shared processing resources and data to computers and other devices on demand. It can be in various forms like IaaS, PaaS, SaaS, DaaS etc. Big Data Analytics: Big data analytics is the process of examining large data sets containing various forms of data types—i.e. Big Data – to uncover hidden patterns, unknown correlations, market trends, customer preferences and other useful business information.

Communication Protocols: They form the backbone of IOT systems to enable connectivity and coupling to applications and these protocols facilitate exchange of data over the network as these protocols enable data exchange formats, data encoding and addressing.

Embedded Systems: It is a sort of computer system which consists of both hardware and software to perform specific tasks. It includes microprocessor/microcontroller, RAM/ROM, networking components, I/O units and storage devices.

III. The Present System

Recently climatic change and environmental monitoring and management have received much attention. The survey introduces three different IOT based wireless sensors for environmental and ambient monitoring: one employing User Datagram Protocol (UDP)-based Wi-Fi communication, one communicating through Wi-Fi and Hypertext Transfer Protocol (HTTP) and third one using Bluetooth Smart. The above presented systems help in recording data at remote locations and viewing it from every device with an Internet connection. Here Zigbee is used to monitor and control application where wireless connectivity is required. UDP based cyber physical system monitors the temperature and relative humidity. Here the losses are caused by the network itself. The Wi-Fi sends the UDP or HTTP packets to a Cloud Platform which makes it available only to the administrator who decides whether the data must be public or private. BLE consist of sensors placed at various areas at which they produce a beacon when data is received and the server takes the information from the sensors whenever the beacon is produced. The available Environmental Monitoring System (EMS) uses UDP protocol which requires the establishment of connection and IP matching every time. Direct access of the geographical information is not available since the information is sent to a centralized platform and admin plays a major role.

IV. Important Sensors for Smart Farming

The practical system involves number of sensors. The prime sensors used for a dynamic Smart Farming System includes:

Soil Moisture Sensor:

Soil Moisture Sensor is used to measure the water content in the soil. The soil moisture sensors typically refer to sensors that estimate volumetric water content.

Humidity sensor:

Humidity sensor (DHT11) is used to measure the water content in the atmosphere. Voltage signal is given to the inverting input terminal of the comparator. The reference voltage is given to non-inverting input terminal

Temperature sensor:

Temperature sensor is used to measure the temperature with an electrical output proportional to the temperature. The LM 35 device does the function of measuring the surrounding temperature.

Rain Water Level Detector:

Rain water level detector is used to measure the rain or water levels. It detects water that completes the circuits on its sensor board's printed leads.

Gas Sensor:

Gas sensor is a device used to detect the presence of gases in an area, often as part of a safety system. MQ 135 sensor is highly sensitive to Ammonia, Sulphide and benzene steam.

Accelerometer:

Accelerometer is used to measure the acceleration in all three axis. The output is in the form of analog values. So the interface with a microcontroller is extremely easy.

V. Conclusion

The Agriculture is back bone of our country. The present problems faced by farmers can be minimized only by converting farming into smart farming. In smart farming modern technologies can be deployed for better production. This paper describes the technological aspects required for a modern farming system.

VI. References

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